

CLAIMS

1. A liquid-phase process for polymerizing α -olefins of the formula $\text{CH}_2=\text{CHR}$, where R is H or an alkyl radical C1-C6, to produce a polymer that is soluble in the reaction medium, comprising the steps of:
 - a) continuously polymerising in liquid phase the α -olefin in the presence of a catalyst system based on a transition metal compound;
 - b) continuously withdrawing from step a) a solution of the polymer in the liquid reaction medium;
 - c) mixing in one or more mixing stages said solution of the polymer in the reaction medium with an organic deactivator having: at least a hydroxy group, a boiling point higher than 150°C, and a ratio between the molecular weight (MW) and the number of hydroxy groups (n_{OH}) comprised between 20 and 100.
2. The process according to claim 1, wherein said α -olefin is butene-1.
3. The process according to claims 1-2, wherein a solution of polybutene-1 in the reaction medium is continuously obtained in step a).
4. The process according to claim 3, wherein the reaction medium is liquid butene-1.
5. The process according to claims 1-3, wherein the polymerization step a) is carried out at a temperature in the range of from 65 to 85°C.
6. The process according to claims 1-4, wherein the polymerization step a) is carried out at a pressure comprised between 8 and 40 bar.
7. The process according to claim 1, wherein the polymerization step a) is performed in one or more continuously stirred tank reactors.
8. The process according to claim 1, wherein in step a) the concentration of polybutene-1 in butene-1 is kept to a value of less than 35% by weight.
9. The process according to claim 8, wherein said concentration is comprised between 10 and 30% by weight.
10. The process according to claims 1-9, wherein in step a) butene-1 is polymerized in the presence of up to 20% by weight, preferably 0,5-10% by weight based on butene-1, of another α -olefin.
11. The process according to claim 1, wherein the organic deactivator of step c) is characterized by a ratio between the molecular weight (MW) and the number of hydroxy groups (OH) comprised between 30 and 70.
12. The process according to claim 1, wherein said deactivator is selected from

propylen glycol, dipropylen glycol, glycerol, diethylen glycol, butandiol.

13. The process according to claim 1, wherein the catalyst system of step a) is a Ziegler-Natta catalyst comprising a Ti-based compound as the solid catalyst component and an Aluminum alkyl compound as an activator.
14. The process according to claims 1-13, wherein in step c) the molar ratio deactivator/(Ti+Al) is higher than $2/n_{OH}$, wherein n_{OH} is the number of hydroxy groups of the deactivator.
15. The process according to claim 14 wherein said molar ratio is comprised between $3/n_{OH}$ and $6/n_{OH}$.
16. The process according to claims 1-15, wherein step c) is carried out in one or more mixing tanks placed in series.
17. The process according to claims 1-15, wherein step c) is carried out in a single deactivation apparatus equipped with a sequence of mixing stages.
18. The process according to claim 17, wherein the deactivation apparatus comprises a stirring shaft provided with impellers in a number comprised between 2 and 20.
19. The process according to claims 17-18 wherein said mixing stages are formed along the shaft of the apparatus by the rotation of each impeller.
20. The process according to claims 17-19, wherein the impellers are equipped with radial blades fixed at the stirring shaft, said radial blades causing a radial flow inside each mixing stage.
21. The process according to claims 1 and 17-20, wherein said polymeric solution and said organic deactivator are continuously fed at the inlet of said deactivation apparatus and flow slowly through the sequence of said mixing stages.
22. The process according to claims 1-21, wherein downstream step c) the solution of polybutene in butene-1 is passed to a separation step, wherein the polybutene-1 is separated from the unreacted monomer, which is recovered and re-circulated to the polymerization step a).
23. The process according to claim 22, wherein said separation step is carried out by melt devolatilization by means of one or more volatilization chambers operating at a decreasing pressure.